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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/599,350	ZUBACK, JOSEPH EDWARD	
	Examiner	Art Unit	
	Denise R. Anderson	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,10-23,25 and 27-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,10-23,25 and 27-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. The objections are withdrawn to claims 7-9, 15, 16, 19, 20, 21-23, 25, 30, and 34. Claims 8 and 9 were cancelled and the remaining claims were amended to clarify what was being claimed and to correct for typographical errors.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 21-24 and 29 were rejected as being indefinite under the second paragraph of 35 U.S.C. 112. Claim 24 was cancelled. Claim 29 was amended so that it now depends on claim 28 and not on claim 25. The rejections to claims 24 and 29 are withdrawn. The rejections to claims 21-23 remain for the reasons that follow.

4. Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term “less than a predetermined quantity” in claim 21 is a relative term which renders the claim indefinite. The term "less than a predetermined quantity" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The suspended solids content has

been rendered indefinite by the use of the term "less than a predetermined quantity" in claim 21.

5. Claims 22 and 23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "sufficient to allow it to be returned to the ocean" in each of claims 22 and 23 is a relative term which renders both claims indefinite. The term "sufficient to allow it to be returned to the ocean" is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The suspended solids content has been rendered indefinite by the use of the term "sufficient to allow it to be returned to the ocean" in each of claims 22 and 23.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-2, 6-7, 10, 16-17, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Daly et al. (Patent No. 6,120,688, Sept. 19, 2000). The claims appear below in italics with the prior art and examiner's comments in normal font.

Claim 1. (Currently Amended) A method of purifying impure water (Daly et al., Abstract, line 1; Figure) *contaminated with a filterable impurity and a dissolved impurity, the method comprising the steps of:*

providing impure water (Daly et al., Figure, reference number 8) *to a primary microfiltration or ultrafiltration unit* (Daly et al., Figure, reference number 20) *to remove the filterable impurity and produce impure filtered water contaminated with a dissolved impurity* (Daly et al., Figure, water is introduced to the ultrafiltration unit through the line labeled "11" using a feed pump and a raw water pump; Column 4, lines 11-14)*;*

providing the impure filtered water contaminated with a dissolved impurity to a reverse osmosis unit (Daly et al., Figure, reference number 70) *to produce a potable water stream* (Daly et al., Figure, reference number 76; Column 6, lines 38-40 and 51-53 where it is stated that the storage tank 80 stores potable water) *and a residual reverse osmosis stream* (Daly et al., Figure, reference number 82) (Daly et al., Figure, impure filtered water is provided through lines 26, 35, 36, 37, 52, and 62 using process pumps 50 and 60; column 6, lines 28-38)*; and*

treating the residual reverse osmosis stream (Daly et al., Figure, reference number 82) *by passing the stream through a secondary filter* (Daly et al., Figure, reference number 86) *to produce a treated residual reverse osmosis stream* (Daly et al., Figure, reference number 94) (Daly et al., Figure, the residual reverse osmosis stream "82" enters the secondary

filter "86" and exits as either potable water in line "92" or as a treated residual reverse osmosis stream "94" to be stored in the CIP tank "100" for reuse as backwash; Column 6, lines 48-67); *and*

backwashing the primary microfiltration or ultrafiltration unit with the treated residual reverse osmosis stream (Daly et al., Figure, the treated residual reverse osmosis stream "94" is stored in the CIP tank "100" for reuse as backwash for the tubular membranes "22" in the primary microfiltration or ultrafiltration unit "20" ; Column 6, lines 48-67).

In summary, Daly et al. anticipates claim 1.

Claim 2. (Currently Amended) The method according to claim 1 wherein the secondary filter is a microfiltration or ultrafiltration membrane.

Daly et al. anticipates claim 1 and further teaches that during backflushing of the primary microfiltration or ultrafiltration unit 20, pump 50 is used to transfer the treated residual reverse osmosis stream stored in the CIP tank 100 through line 104, through valve 44, along line 52, through a 10 micron filter (applicant's secondary filter that is a microfiltration membrane), into line 12, through valve 42, through lines 36 and 26 and on into the tubular membrane 22 that is part of the ultrafiltration unit 20 (applicant's primary microfiltration or ultrafiltration unit). Daly et al., Figure, Column 6, line 66 to Column 7, line 16.

In other words, Daly et al. shows two treatment filters, or secondary filters, on the way to backwash the primary microfiltration or ultrafiltration unit. In the Daly

et al. figure, the first treatment filter is the reverse osmosis filter 86 and the second treatment filter is the microfiltration filter 54. In summary, Daly et al. disclose a secondary filter that is a microfiltration membrane. In summary, Daly et al. anticipates claim 2.

Claim 6. (Currently Amended) The method according to claim 1 wherein the impure water is sea water.

Daly et al. teaches all claim 1 limitations and further teaches that the "impure water source can include diverse water sources, including sea water." Daly et al., Column 3, lines 33-34. In summary, Daly et al. anticipates claim 6.

Claim 7. (Currently Amended) The method according to claim 1 wherein the filterable impurity includes those typically found in sea water.

Daly et al. anticipates claim 1 and further teaches that the "impure water source can include diverse water sources, including sea water." Daly et al., Column 3, lines 33-34. Sea water includes "filterable impurities typically found in sea water." In summary Daly et al. anticipates claim 7.

Claim 10. (Currently Amended) The method according to claim 1 wherein the dissolved impurity includes sodium ions and chloride ions.

Daly et al. anticipates claim 1 and further teaches that the "impure water source can include diverse water sources, including sea water." Daly et al.,

Column 3, lines 33-34. Sea water inherently contains sodium ions and chloride ions. For example, Wikipedia (http://en.wikipedia.org/wiki/Seawater, first paragraph of page 1, July 15, 2007) teaches that it is known that sea water has approximately 3.5% (by weight) of dissolved salts, mostly the ions of sodium chloride, i.e. sodium ions and chloride ions. In summary, Daly et al. anticipates claim 10.

Claim 16. (Currently Amended) The method according to claim 1 further comprising subjecting the residual reverse osmosis stream to ultrafiltration or microfiltration by a secondary ultrafiltration or microfiltration unit prior to the step of backwashing.

Daly et al. anticipates claim 1 and further teaches that during backflushing of the primary microfiltration or ultrafiltration unit 20, pump 50 is used to transfer the residual reverse osmosis stream stored in the CIP tank 100 through line 104, through valve 44, along line 52, through a 10 micron filter (applicant's secondary filter that is a ultrafiltration or microfiltration unit), into line 12, through valve 42, through lines 36 and 26 and on into the tubular membrane 22 that is part of the ultrafiltration unit 20 (applicant's primary microfiltration or ultrafiltration unit). Daly et al., Figure, Column 6, line 66 to Column 7, line 16. In summary, Daly et al. discloses the residual reverse osmosis stream subject to ultrafiltration or microfiltration prior to backwashing. Daly et al. anticipates claim 16.

Claim 17. (Currently Amended) The method according to claim 1 wherein the step of treating comprises filtering using multiple stages of filtration.

Daly et al. anticipates claim 1 and further teaches a secondary filter with multiple stages of filtration. Daly et al., Column 1, lines 16-24; Column 1, lines 40-43. In summary, Daly et al. anticipates claim 17.

Claim 20. (Currently Amended) A method of facilitating the purification of impure water (Daly et al., Abstract, line 1; Figure), *the method comprising the steps of;*

providing a primary microfiltration or ultrafiltration unit (Daly et al., Figure reference number 20);

providing a reverse osmosis unit (Daly et al., Figure, reference number 70) *in downstream fluid communication from said primary microfiltration or ultrafiltration unit* (Daly et al., Figure, impure filtered water is provided through lines 26, 35, 36, 37, 52, and 62 using process pumps 50 and 60; column 6, lines 28-38);

providing a secondary microfiltration or ultrafiltration unit (Daly et al., Figure, reference number 86) *to produce a filtered residual reverse osmosis stream* (Daly et al., Figure, reference number 94) (Daly et al., Figure, the residual reverse osmosis stream "82" enters the secondary filter "86" and exits as either potable water in line "92" or as a filtered residual reverse osmosis stream "94" to be stored in the CIP tank "100" for reuse as backwash; Column 6, lines 48-67); *and*

providing a controllable fluid pathway (Daly et al., Figure, Column 6, line 66 through Column 7, line 16) *for directing the filtered residual reverse osmosis feed to backwash said microfiltration or ultrafiltration unit* (Daly et al., Figure, Column 6, lines 48-67 which states that the treated residual reverse osmosis stream 94 is stored in the CIP tank 100 for reuse as backwash for the tubular membranes 22 in the primary microfiltration or ultrafiltration unit 20; Column 7, lines 12-16 where it is stated, "Instead of drawing water from membranes 22, pump 50 draws retentate [applicant's filtered residual reverse osmosis feed] from CIP tank 100 along line 104, thorough valve 44 (now open) , along line 52 and into line 112, including quick-disconnect hose 113. On backflush, the retentate is directed through valve 42 (now open) through lines 36 and 26. The retentate enters the inside of tubular membranes 22 [part of applicant's microfiltration or ultrafiltration unit that Daly labels as reference number 20] and dislodges foulants from the membranes. Backflushing may be programmed at any desired interval for any desired period.")

In summary, Daly et al. anticipates claim 20.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 3 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Daly et al. (Patent No. 6,120,688, Sept. 19, 2000) as applied to claims 1 and 17 above. The claims appear below in italics with the examiner's comments in normal font.

Claim 3. (Currently Amended) The method according to claim 2 wherein the secondary filter is backwashed.

Daly et al. anticipates claim and further teaches that the primary microfiltration or ultrafiltration units are backwashed to clean them. Daly et al., Figure, Column 7, lines 13-15. Thus, Daly et al. implies backwashing the secondary filter that is a microfiltration filter and appears as reference number 54 in the Figure. It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Daly et al. method, to backwash the secondary filter, as taught by Daly et al. for the primary microfiltration or ultrafiltration units, since such a modification would clean the secondary filter.

In summary, Daly et al. discloses or suggests all claim 3 limitations.

Claim 18. (Currently Amended) The method according to claim 17 wherein the step of treating comprises filtering through a coarse filter prior to filtering through a membrane filter.

Daly et al. anticipates claim 17. Daly et al. further teaches the presence of a course filter but does not expressly teach a course filter as part of a secondary filter prior to the "reverse osmosis ('RO') modules". Daly et al, Column 1, lines 25-38. It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Daly et al. method, to place a course filter prior to any membrane filter, including the remaining secondary filter stages, as taught by Daly et al., since Daly et al. states at Column 1, lines 32-34 that such a modification would remove suspended solids and "feed water freed from suspended solids to the RO modules" (applicant's membrane filter).

In summary then, Daly et al. discloses or suggests all claim 18 limitations.

11. Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Daly et al. (Patent No. 6,120,688, Sept. 19, 2000) as applied to claim 1 above, and further in view of Marius et al. (Patent No. 5,059,317, Oct. 22, 1991). The claims appear below in italics with the examiner's comments in normal font.

Claim 4. (Currently Amended) The method according to claim 1 wherein the secondary filter is a cartridge filter.

Daly et al. discloses the claimed invention except for the cartridge filter as a secondary filter. Marius et al. teaches a "combination of micro filtration and reverse osmosis" (Figure 1, reference part 40) used to "provide drinking water" and that, in certain cases, cartridge filters (Figure 1, reference parts 59 or 59') are added downstream of the microfiltration and reverse osmosis units to further treat the water before use. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a cartridge filter as the secondary filter in the Daly et al. method, as taught by Marius et al., since Marius et al. states at Column 3, lines 32-38 that such a modification would provide drinking water if the waste water contained dissolved radionucleides could not be made potable with microfiltration and reverse osmosis alone.

In summary, Daly et al., in view of Marius et al., discloses or suggests all claim 4 limitations.

Claim 5. (Currently Amended) The method according to claim 4 wherein the secondary filter is backwashed. Daly et al. discloses the claimed invention except for the cartridge filter being backwashed. Marius et al. teaches that it is known to backwash a cartridge filter. Marius et al., Column 3, lines 38-49; Figure 1. Specifically, Marius et al. teaches that two cartridge filters with ion exchange resins are piped in parallel so that at least one filter "with unexhausted resinous material, is always placed in the liquid stream." The ion exchange resin rejuvenation cycle is then described, i.e. how the secondary filter is backwashed

is then described. Marius et al., Column 3, lines 38-49; Figure 1. It would have been obvious to one having ordinary skill in the art at the time the invention was made to backwash the secondary cartridge filter in the Daly et al. method, as taught by Marius et al. since Marius et al. states at Column 3 lines 38-49 that such a modification would rejuvenate the ion exchange resin in the cartridge filter.

In summary, Daly et al., in view of Marius et al., discloses or suggests all claim 5 limitations.

12. Claims 11-15, 19, 25, and 27-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Daly et al. (Patent No. 6,120,688, Sept. 19, 2000) as applied to claim 1 above, and further in view of Water Encyclopedia (Jay Lehr, editor, John Wiley & Sons, Inc., New York, 2005). Applicant wishes to further treat a water stream, specifically the residual reverse osmosis stream, prior to reuse. Water treatment is an old science, as evidenced by the five volumes in the Water Encyclopedia. The approach taken to the patentability analysis below is that Daly et al. disclosed the method of claim 1 and the various chemical treatments, radiation treatments, and physical treatments are taught in the Water Encyclopedia to further purify or enhance the residual reverse osmosis stream prior to reuse in the Daly et al. method. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply needed treatments to the residual reverse osmosis stream in the Daly et al.

method, as taught by the Water Encyclopedia, because such modifications would further purify or enhance the residual reverse osmosis stream prior to reuse.

Claim 11. (Currently Amended) The method according to claim 1 further comprising treating the residual reverse osmosis stream prior to being reused by one or more of a chemical treatment, a radiation treatment or a physical treatment.

Daly et al. anticipates claim 1 limitations but does not teach a specific chemical treatment like chlorination, or a radiation treatment like UV, or a physical treatment like ultasonication. The Water Encyclopedia teaches all three treatments as methods to enhance or purify water.

The Water Encyclopedia teaches a chemical treatment. One such chemical treatment is chlorination where "chlorine is added to water to kill disease-causing bacteria, parasites, and other organisms." Water Encyclopedia, Chlorination, 2:88, Introduction, ¶ 1.

The Water Encyclopedia teaches a radiation treatment. One such radiation treatment is UV light that is used as "a reliable means of disinfection." Water Encyclopedia, Ultraviolet Disinfection, 1:466, What is UV Disinfection? ¶ 1.

Finally, the Water Encyclopedia teaches a physical treatment to purify water – namely ultrasonication or ultrasonic irradiation. In this treatment, water is irradiated with ultrasonic waves that heat up small water pockets to the point of vaporization. This is known as "cavitation" which "may function as a microreactor" to either destroy "volatile organic compounds inside" or serve as a

"H*, OH*, OOH* radical source that may react with pollutants in the bulk of solution." Water Encyclopedia, Waste Treatment Techniques – Advanced, 1:875, Ultrasonic Irradiation, ¶ 1 and Figure 7.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to treat the residual reverse osmosis stream, if needed, by one or more chemical treatments, radiation treatments, or physical treatments, as taught by the Water Encyclopedia, because such a modification would either enhance or purify the water before reuse.

In summary, Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 11 limitations.

Claim 12. (Currently Amended) The method according to claim 11 wherein the chemical treatment is chlorination, fluorination, disinfection, scale control treatment, water softening, peroxide, sulfite/bisulfite, ozone or mixtures thereof.

Daly et al., in view of the Water Encyclopedia, discloses all claim 11 limitations. The Water Encyclopedia further teaches:

Chlorination where "chlorine is added to water to kill disease-causing bacteria, parasites, and other organisms." Water Encyclopedia, Chlorination, 2:88, Introduction, ¶ 1.

Fluoridation where fluoride is added to community water supplies to prevent tooth decay. Water Encyclopedia, Fluoridation, 1:254, ¶ 1.

Scale control treatment where chemicals are added to solubilize calcium carbonate $CaCO_3$ and prevent it from scaling out on equipment – which causes equipment operating problems. Water Encyclopedia, Industrial Cooling Water – Scale Formation, 1:547-548, Scaling Control, ¶ 1.

Water softening where either hydrated lime [$Ca(OH)_2$] or quicklime (CaO) are added to the water to improve the quality for domestic use, i.e. reduce scale in water heaters or allow soap to lather well. Water Encyclopedia, Lime Softening, 1:322, ¶ 1.

Peroxide as an alternative disinfection method to chlorination. Water Encyclopedia, Threat Agent and Water Biosecurity, 1:88, Survival of Threat Agents in Water, last paragraph.

Sulfite / bisulfate for the dechlorination of water. Water Encyclopedia, Dechlorination, 1:169, ¶ 2.

Ozone as a "powerful oxidizing and disinfecting agent" and as one of the treatment "technologies for small drinking water systems." Water Encyclopedia, Treatment for Technologies for Small Drinking Water Systems, 1:458, paragraph entitled "Ozonation."

It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Daly et al. method, to treat the residual reverse osmosis stream, if needed, by one or more chemical treatments from the list of chlorination, fluorination, disinfection, scale control treatment, water softening,

peroxide, sulfite/bisulfite, or ozone, as taught by the Water Encyclopedia, because such modifications would enhance the water before reuse.

In summary, Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 12 limitations.

Claim 13. (Currently Amended) The method according to claim 11 wherein the radiation treatment is selected from the group consisting of UV, IR, microwave or mixtures thereof.

Daly et al., in view of the Water Encyclopedia, discloses all claim 11 limitations. The Water Encyclopedia further teaches:

UV irradiation as "a reliable means of disinfection." Water Encyclopedia, Ultraviolet Disinfection, 1:466, What is UV Disinfection? ¶ 1.

Heat can be used to purify water via vaporization. Water Encyclopedia, Wastewater Treatment and Recycling Technologies, 1:813, Thermal Technologies - Distillation, ¶ 1. Both IR and microwave irradiation can serve as heat sources.

It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Daly et al. method, to treat the residual reverse osmosis stream, if needed, by one or more radiation treatments from the list of UV, IR and microwave, as taught by the Water Encyclopedia, because such modifications would enhance the water or purify it before reuse.

In summary, Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 13 limitations.

Claim 14. (Currently Amended) The method according to claim 11 wherein the physical treatment is ultrasonication or vortexing.

Daly et al., in view of the Water Encyclopedia, discloses all claim 11 limitations. The Water Encyclopedia further teaches:

Ultrasonication where water is irradiated with ultrasonic waves that heat up small water pockets to the point of vaporization. This is known as "cavitation" which "may function as a microreactor" to either destroy "volatile organic compounds inside" or serve as a "H*, OH*, OOH* radical source that may react with pollutants in the bulk of solution." Water Encyclopedia, Wastewater Treatment Techniques – Advanced, 1:875, Ultrasonic Irradiation, ¶ 1 and Figure 7.

Vortexing where solids are separated from sewage water. Water Encyclopedia, Combined Sewer Overflow Treatment, 1:784, Physical Treatment – Swirl/Vortex Technologies, ¶ 1, Figure 3.

It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Daly et al. method, to treat the residual reverse osmosis stream, if needed, by one or more physical treatments from the list of ultrasonication or vortexing, as taught by the Water Encyclopedia, because such modifications would enhance or purify the water before reuse.

In summary, Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 14 limitations.

Claim 15. (Currently Amended) The method according to claim 11 wherein the reverse osmosis stream is treated by heat, electroprecipitation, magnetic treatments or combinations thereof.

Daly et al., in view of the Water Encyclopedia, discloses all claim 11 limitations. The Water Encyclopedia further teaches that:

Heat can be used to purify water via distillation. Water Encyclopedia, Wasterwater Treatment and Recycling Technologies, 1:813, Thermal Technologies – Distillation, ¶ 1.

Electroprecipitation (electrolysis) can be used to deposit or decompose soluble inorganics or organics on to an electrode surface by an electrochemical redox reaction. Water Encyclopedia, Wastewater Treatment and Recycling Technologies, 1:812, Electrical Technologies – Electrolysis, ¶ 1.

Magnetic treatments can be used to control hard water scale. Water Encyclopedia, Physical Water Conditioning, 1:141, ¶ 1.

It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Daly et al. method to treat the residual reverse osmosis stream, if needed, by one or more treatments from the list of heat, electroprecipitation, or magnetic treatments, as taught by the Water

Encyclopedia, because such modifications would enhance or purify the water before reuse.

In summary, Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 15 limitations.

Claim 19. (Currently Amended) The method according to claim 18 wherein the residual reverse osmosis stream is in controllable fluid communication with coarse backwashable filters such as single or multimedia filters, disc filters, diatomaceous earth filters, membrane filters, strainers, or screens.

Daly et al. discloses all claim 18 limitations including that the residual reverse osmosis stream is in controllable fluid communication with backwashable filters. Daly et al., Figure, Column 6, line 66 through Column 7, line 16. Daly et al. further discloses strainers. Daly et al., Figure, reference number 6; Column 3, lines 53-55. The Water Encyclopedia also discloses backwashable filters and further teaches single or multimedia filters, disk filters, diatomaceous earth filters, membrane filters, and screens.

Backwashable filters are used so that they can be cleaned and, thus, filtrate quality is maintained. Water Encyclopedia, Filtration Water Treatment, 1:245-246, first two paragraphs of the article.

Single or multimedia filters are used to produce clear water and to improve taste and reduce odor: Water Encyclopedia, Filtration Water Treatment, 1:245-246, first paragraph of the article and sixth paragraph of the article.

Disk filters such as are used to aerate water. These filters are often sintered ceramic plates: Water Encyclopedia, Fine Bubble Diffused Air Aeration Systems, 1:626, Figure 4 and the third paragraph of the article.

Diatomaceous earth filters are used to remove particles in the water: Water Encyclopedia, Filtration Water Treatment, 1:247, third paragraph on the page beginning with "Diatomaceous earth filtration."

Membrane filters are used to produce potable water from seawater or brackish water: Water Encyclopedia, Filtration Water Treatment, 1:247, fourth paragraph on the page beginning with "Membrane filtration."

Strainers: Daly et al., Figure, reference number 6.

Screens are used to remove solids from wastewater. Water Encyclopedia, Wastewater Treatment and Recycling Technologies, 1:809, paragraph following the title "Screening, Filtration, and Centrifugal Separation."

It would have been obvious to one having ordinary skill in the art at the time the invention was made to match the Daly et al. method with the correct filter alternative listed in the claim and taught by the Water Encyclopedia, because such a modification would achieve the design objectives for the particular situation at hand.

In summary then, Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 19 limitations.

Claim 25. (Currently Amended) A system for purifying impure water (Daly et al., Abstract, line 1; Figure) *contaminated with a filterable impurity and a dissolved impurity, comprising:*

a primary microfiltration or ultrafiltration unit (Daly et al., Figure, reference number 20) *to remove the filterable impurity;*

a reverse osmosis unit (Daly et al., Figure, reference number 70) *to produce a potable water stream* (Daly et al., Figure, reference number 76; Column 6, lines 38-40 and 51-53 where it is stated that the storage tank 80 stores potable water) *and a residual reverse osmosis stream* (Daly et al., Figure reference number 82),

said reverse osmosis unit in downstream fluid communication from said primary microfiltration or ultrafiltration unit (Daly et al., Figure, impure filtered water is provided through lines 26, 35, 36, 37, 52, and 62 using process pumps 50 and 60; Column 6, lines 28-38);

a controllable fluid pathway to transfer a stream of impure filtered water contaminated with a dissolved impurity from the primary microfiltration or ultrafiltration unit to the reverse osmosis unit;

means for treating the residual reverse osmosis stream to produce a treated residual reverse osmosis stream; and

a controllable (Daly et al., Figure, Column 6, line 66 through Column 7, line 16) *fluid pathway directing the treated residual reverse osmosis stream to backwash the primary microfiltration or ultrafiltration unit.*

Daly et al expressly discloses claim 25 except for two limitations. The first limitation is "the controllable fluid pathway" to transfer impure filtered water from the primary microfiltration or ultrafiltration unit to the reverse osmosis unit. Daly et al. expressly describes a control system to direct the residual reverse osmosis stream (reverse osmosis retentate) from the CIP tank (reference number 100) to backflush the primary filtration unit (reference number 20). Daly et al., Figure; Column 6, line 66 through Column 7, line 16. This would imply that Daly et al. also controls the flow from the primary filtration unit to the reverse osmosis unit. It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Daly et al. system, to provide a "controllable fluid pathway" from the primary filtration unit to the reverse osmosis unit as was done with the "controllable fluid pathway" from the CIP tank to the primary filtration unit, in order to automate the system.

The second limitation that Daly did not expressly disclose was the means for treating the residual reverse osmosis stream prior to reuse. The patentability analysis for the various "means" follows the same reasoning as claims 11-15 and 19 and will not be repeated here. In summary then, Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 25 limitations.

Claim 27. (Currently Amended) The system according to claim 25 further comprising a controllable fluid pathway directing the residual reverse osmosis

stream through a secondary microfiltration or ultrafiltration membrane to backwash the primary microfiltration or ultrafiltration unit.

Daly et al., in view of Water Encyclopedia, discloses or suggests all claim 25 limitations. Daly et al. further teaches that during backflushing (applicant's backwashing) of the primary microfiltration or ultrafiltration unit 20, pump 50 is used to transfer the residual reverse osmosis stream stored in the CIP tank 100 through a controllable fluid pathway, i.e. line 104, through valve 44, along line 52, through a 10 micron filter (applicant's secondary filter that is a microfiltration membrane), into line 12, through valve 42, through lines 36 and 26 and on into the tubular membrane 22 that is part of the ultrafiltration unit 20 (applicant's primary microfiltration or ultrafiltration unit). Daly et al., Figure, Column 6, line 66 to Column 7, line 16. Daly et al. discloses a controllable fluid pathway directing the residual reverse osmosis stream through a secondary microfiltration or ultrafiltration membrane to backwash the primary microfiltration or ultrafiltration unit. In summary, Daly et al., in view of Water Encyclopedia, discloses or suggests all claim 27 limitations.

Claim 28. (Currently Amended) The system according to claim 25 further including one or any combination of ports for the introduction of chemical agents, irradiation means, ultrasonic generators, vortexing devices, heating elements, electroprecipitators and magnets.

Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 25 limitations. The patentability analysis for the various "ports" follows the same reasoning as for "chemical treatments," "radiation treatments," "ultrasonication," "vortexing," "heat," "electroprecipitation," and "magnetic treatments" in claims 11 and 13-15 and will not be repeated here. In summary, Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 28 limitations.

Claim 29. (Currently Amended) The system according to claim 28 wherein the chemical agents are chlorination agents, fluorination agents, ozonation agents, disinfecting agents, scale control treatment agents, water softening agents, peroxide, sulfite/bisulfite.

Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 28 limitations. The patentability analysis for the chemical "agents" follows the same reasoning used for the chemical "treatments" in claims 11-12 and will not be repeated here. In summary, Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 29 limitations.

Claim 30. (Currently Amended) The system according to claim 25 for purifying impure water contaminated with a filterable impurity and a dissolved impurity, comprising:

a primary microfiltration or ultrafiltration unit to remove the filterable impurity;

a reverse osmosis unit to produce a potable water stream and a residual reverse osmosis stream;

said reverse osmosis unit in downstream fluid communication from said primary microfiltration or ultrafiltration unit;

a controllable fluid pathway to transfer impure filtered water with a dissolved impurity from the primary microfiltration or ultrafiltration unit to the reverse osmosis unit; and

a conduit to transfer a residual reverse osmosis stream from the reverse osmosis unit to backwash the primary microfiltration or ultrafiltration unit via a secondary microfiltration or ultrafiltration unit.

Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 25 limitations. Claim 30 adds the limitation of a conduit to transfer the residual reverse osmosis stream from the reverse osmosis unit to backwash the primary microfiltration or ultrafiltration unit. Claim 30 also adds the limitation that there is a secondary microfiltration or ultrafiltration unit within the conduit.

Daly et al. discloses the conduit that runs from the reverse osmosis unit to the primary microfiltration or ultrafiltration unit during backwash. Daly et al., Figure, Column 6 line 66 through Column 7, line 28. Daly et al. also discloses that a secondary microfiltration or ultrafiltration unit exists within that conduit in the form of a 10 micron filter (reference number 54).

In summary, Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 30 limitations.

Claim 31. (Currently Amended) The system according to claim 25 wherein the secondary microfiltration or ultrafiltration unit is a backwashable or disposable cartridge microfiltration or ultrafiltration system.

Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 25 limitations. The Water Encyclopedia further teaches, "Membrane assemblies are contained in pressure vessels or cartridges. Low-pressure membranes in the form of either ultrafiltration (UF) or microfiltration (MF) have become economical in capital costs and have received increased attention in drinking water application." The Water Encyclopedia, Filtration Water Treatment, 1:247, paragraph 4. The Water Encyclopedia also teaches that cartridge filters can use either a "cleanable ceramic" or a "disposable polypropylene" cartridge. Therefore, the Water Encyclopedia teaches that the secondary microfiltration or ultrafiltration unit is a backwashable or disposable cartridge. It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate a backwashable or disposable cartridge as a secondary microfiltration or ultrafiltration unit into the Daly et al. apparatus, as taught by the Water Encyclopedia, since the Water Encyclopedia states at 1:247, paragraph 4, that such a modification is becoming more economical and receiving increased attention in drinking water application.

In summary, Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 31 limitations.

Claim 32. (Currently Amended) The system according to claim 25 wherein the secondary microfiltration or ultrafiltration unit comprises multiple stages of filtration.

Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 25 limitations. Daley et al. further teaches a secondary filter with multiple stages of filtration. Daly et al., Column 1, lines 16-24; Column 1, lines 40-43. In summary, Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 32 limitations.

Claim 33. (Currently Amended) The system according to claim 32 wherein the multiple stages of filtration include a first filtration through a coarse filter prior to filtration through a membrane filter.

Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 32 limitations. Daly et al. further teaches the presence of a course filter but does not expressly teach a course filter as part of a secondary filter prior to the "reverse osmosis ('RO') modules". Daly et al, Column 1, lines 25-38. It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Daly et al. system, to place a course filter prior to any membrane filter, including the remaining secondary filter stages, as taught by Daly et al., since Daly et al. states at Column 1, lines 32-34 that such a

modification would remove suspended solids and "feed water freed from suspended solids to the RO modules" (applicant's membrane filter).

In summary then, Daly et al. discloses or suggests all claim 33 limitations.

Claim 34. (Currently Amended) The system according to claim 25 wherein the residual reverse osmosis stream is in controllable fluid communication with coarse backwashable filters such as single or multimedia filters, disc filters, diatomaceous earth filters, membrane filters, strainers, or screens.

Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 25 limitations including that the residual reverse osmosis stream is in controllable fluid communication with backwashable filters. Daly et al., Figure, Column 6, line 66 through Column 7, line 16. Daly et al. further discloses strainers. Daly et al., Figure, reference number 6; Column 3, lines 53-55. The Water Encyclopedia also discloses backwashable filters and further teaches single or multimedia filters, disk filters, diatomaceous earth filters, membrane filters, and screens.

Backwashable filters are used so that they can be cleaned and, thus, filtrate quality is maintained. Water Encyclopedia, Filtration Water Treatment, 1:245-246, first two paragraphs of the article.

Single or multimedia filters are used to produce clear water and to improve taste and reduce odor: Water Encyclopedia, Filtration Water Treatment, 1:245-246, first paragraph of the article and sixth paragraph of the article.

Disk filters such as are used to aerate water. These filters are often sintered ceramic plates: Water Encyclopedia, Fine Bubble Diffused Air Aeration Systems, 1:626, Figure 4 and the third paragraph of the article.

Diatomaceous earth filters are used to remove particles in the water: Water Encyclopedia, Filtration Water Treatment, 1:247, third paragraph on the page beginning with "Diatomaceous earth filtration."

Membrane filters are used to produce potable water from seawater or brackish water: Water Encyclopedia, Filtration Water Treatment, 1:247, fourth paragraph on the page beginning with "Membrane filtration."

Strainers: Daly et al., Figure, reference number 6.

Screens are used to remove solids from wastewater. Water Encyclopedia, Wastewater Treatment and Recycling Technologies, 1:809, paragraph following the title "Screening, Filtration, and Centrifugal Separation."

It would have been obvious to one having ordinary skill in the art at the time the invention was made to match the Daly et al. method with the correct filter alternative listed in the claim and taught by the Water Encyclopedia, because such a modification would achieve the design objectives for the particular situation at hand.

In summary, Daly et al., in view of the Water Encyclopedia, discloses or suggests all claim 34 limitations.

Response to Arguments

13. Applicant's arguments filed October 25, 2007 have been fully considered but they are not persuasive. The arguments and the examiner's response are listed below.

a. Claim 1 – Applicant argues that Daly does not disclose the claimed invention because Daly shows the retentate from the secondary filter being used to backwash the primary microfiltration and ultrafiltration unit and applicant meant to claim only that the filtrate be used. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., that the filtrate be the backwash and not the retentate as shown in Daly et al.) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Also, Daly et al. shows two treatment filters on the way to backwash the primary microfiltration or ultrafiltration unit. In the Daly et al. figure, the first treatment filter is the reverse osmosis filter 86 and the second treatment filter is the microfiltration filter 54. The second treatment filter passes on an enhanced filtrate for the backwash that applicant intended to claim. A more detailed patentability analysis is shown above. The examiner maintains that claim 1 is anticipated by Daly et al.

b. Claim 20 – Applicant argues the same as claim 1 and that argument is addressed above. Applicant further argues that Daly et al. does not disclose

the controllable fluid pathway recited in claim 20. That argument is addressed in the patentability analysis above.

c. Claims 2, 6-10, and 17 – Applicant argues that claim 1 is allowable and, therefore the dependent claims 2, 6-10, and 17 are also allowable. Since claim 1 was rejected above, the argument is moot.

d. Claim 3 – Applicant argues that claim 3 is allowable since it depends on claim 1 and claim 1 is allowable. That argument was addressed above.

Applicant argues that the Daly et al. secondary filter 56 is not a secondary filter even though the backwash proceeds through it on the way to the primary microfiltration or ultrafiltration units. That argument is addressed in the above patentability analysis for claim 2, upon which claim 3 depends.

Finally, applicant argues that there is no teaching, suggestion, or motivation for including the step of backwashing the secondary filter. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to one having ordinary skill in the art at the time the invention was

made, in the Daly et al. method, to backwash the secondary filter, as taught by Daly et al. for the primary microfiltration or ultrafiltration units, since such a modification would clean the secondary filter.

e. Claims 4 and 5 – Applicant argues that claims 4 and 5 are allowable since they depend on claim 1 and claim 1 is allowable. That argument was addressed above.

In response to applicant's argument that Marius et al. is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Marius et al. is processing drinking water and applicant's invention relates to the production of pure or potable water from impure water, brackish water or seawater. The examiner maintains that Marius et al. is analogous art.

Finally, applicant argues that there is no teaching, suggestion, or motivation for providing a filter cartridge after a microfiltration or ultrafiltration unit and a reverse osmosis unit in series. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either

in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Daly et al. method, to backwash the secondary filter, as taught by Daly et al. for the primary microfiltration or ultrafiltration units, since such a modification would clean the secondary filter.

f. Claims 16 and 18 -- Applicant argues that the claims depend on claim 1 and claim 1 is allowable. Therefore, claims 16 and 18 are allowable. That argument was addressed above. Applicant argues that Daly does not provide teaching, suggestion, or motivation to do the claimed method. That argument is addressed in the above patentability analysis.

g. Claims 11-15, 19, 25-34 -- Applicant argues that the method claims depend on claim 1 and claim 1 is allowable. Therefore, the method claims are allowable. That argument was addressed above. Applicant argues that there is no teaching, suggestion, or motivation to combine the teachings of Daly et al. with those of the Water Encyclopedia for these claims. Those arguments are addressed in the patentability analysis above. Finally, applicant argues that each and every limitation of the claim is not taught in the combined references. These arguments are addressed in the patentability analysis above.

In response to applicant's argument that the Water Encyclopedia reference is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, the Water Encyclopedia is a treatise on water treatment and applicant's invention relates to the production of pure or potable water from impure water, brackish water or seawater. The examiner maintains that the Water Encyclopedia is analogous art.

h. Claim 21 – Applicant argues that a "predetermined quantity" should not be rejected as indefinite under 35 U.S.C. § 112, ¶ 2 because the quantity is chosen by the user of the system. That argument was addressed above in the 112 rejections section.

i. Claims 22 and 23 – Applicant argues that "a suspended solids content sufficient to allow it to be returned" should not be rejected as indefinite 35 U.S.C. § 112, ¶ 2 because the quantity is determined by regulation. That argument was addressed above in the 112 rejections section.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

15. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Denise R. Anderson whose telephone number is 571-270-3166. The examiner can normally be reached on Monday through Thursday, from 8:00 am to 6:00 pm.

17. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter D. Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

18. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DRA

Walter D. Griffin

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